

# **Teachers' Tools for the 21st Century: A Report on Teachers' Use of Technology.**

## **Background**

As the availability of computers and the Internet in schools and classrooms has grown (e.g., Williams, 2000), so has interest in the extent to which these technologies are being used and for what purposes. Using the Fast Response Survey System (FRSS), NCES administered a short survey of public school teachers in 1999 that included items on teachers' use of computers and the Internet. This report draws on that survey to describe teachers' use of education technology in their classrooms and schools, the availability of this technology in their classrooms and schools, their training and preparation for their use, and the barriers to technology use they encounter.

Additional data sources (e.g., National Assessment of Educational Progress [NAEP], Current Population Survey [CPS]) are used throughout the report to provide background information on these topics.

## **Key Findings**

### *Technology and Instruction*

Over the past ten years, NCES has administered surveys focusing primarily on technology (e.g., computers, connections to the Internet) infrastructure in schools and classrooms. The 1999 FRSS survey focused on availability of technology and the way in which these technologies are used.

According to this survey: --Approximately half of the public school teachers who had computers or the Internet available in their schools used them for classroom instruction. Teachers assigned students to use these technologies for word processing or creating spreadsheets most frequently (61 percent did this to some extent), followed by Internet research (51 percent), practicing drills (50 percent), and solving problems and analyzing data (50 percent). Moreover, many teachers used computers or the Internet to conduct a number of preparatory and administrative tasks (e.g., creating instructional materials, gathering information for planning lessons) and communicative (e.g., communication with colleagues) tasks.

--Among those with technology available in their schools, teachers in low minority and low poverty schools were generally more likely than teachers in high minority and high poverty schools to use computers or the Internet for a wide range of activities, including gathering information at school, creating instructional materials at school, communicating with colleagues at school, and instructing students. For example, 57 percent of teachers in schools with less than 6 percent minority enrollments used computers or the Internet for Internet research compared with 41 percent of teachers in schools with 50 percent or more minority enrollments.

--Among teachers with computers available at home, teachers with the fewest years of experience were more likely than teachers with the most years of experience to use computers or the Internet at home to gather information for planning lessons (76 percent compared with 63 percent) and creating instructional materials (91 percent compared with 82 percent). They were also generally more likely than more experienced teachers to use these technologies to access model lesson plans at school and at home.

### *Availability and Use of Technology*

On a most basic level, teachers may be more likely to integrate computers and the Internet into classroom instruction if they have access to adequate equipment and connections. The 1999 FRSS survey on teachers' use of technology provides teachers' perspectives on the availability of computers and the Internet in their schools and classrooms and the general frequency with which these technologies are used. Results of this survey indicate that:

--Nearly all public school teachers (99 percent) reported having computers available somewhere in their schools in 1999; 84 percent had computers available in their classrooms, and 95 percent had computers available elsewhere in the school. Teachers were generally more likely to use computers and the Internet when located in their classrooms than elsewhere in the school, while their students were more likely to use computers and the Internet outside the classroom than inside. Additionally, teachers and students with computers or Internet connections in their classrooms used these technologies elsewhere in the school more often than teachers and students without such tools in their classrooms.

--Most public school teachers (84 percent) reported having at least one computer in their classrooms in 1999. Thirty-six percent of teachers had one computer in their classrooms, 38 percent reported having two to five computers in their classrooms, and 10 percent reported having more than five computers in their classrooms. Teachers and students with more computers or computers connected to the Internet in their classrooms generally used these technologies more often than teachers with fewer computers or Internet connections.

--In 1999, computer and Internet availability was not equally distributed among schools. For example, teachers in schools with the lower minority enrollments (less than 6 percent or 6 to 20 percent) were more likely to have the Internet available in the classroom than teachers in schools with the highest minority enrollments (50 percent or more minority enrollments-69 percent and 71 percent compared with 51 percent). Moreover, teachers in schools with the lowest minority enrollments (Is than 6 percent) were more likely to report having two to five computers connected to the Internet than teachers in schools with the highest minority enrollments (19 percent compared with 9 percent).

--Eighty-two percent of public school teachers reported having a computer available at home, 63 percent of public school teachers had the Internet available at home, and 27 percent reported that their school had a network that they could use to access the Internet from home.

### *Teacher Preparation and Training*

Teachers' preparation and training to use education technology is a key factor to consider when examining their use of computers and the Internet for instructional purposes. The 1999 FRSS survey indicates that:

--In 1999, approximately one-third of teachers reported feeling well-prepared or very well prepared to use computers and the Internet for classroom instruction, with less experienced teachers indicating they felt better prepared to use technology than their more experienced colleagues. For many instructional activities, teachers who reported feeling better prepared to use technology were generally more likely to use it than teachers who indicated that they felt unprepared.

--Teachers cited independent learning most frequently as preparing them for technology use (93 percent), followed by professional development activities (88 percent) and their colleagues (87 percent). Whereas half of all teachers reported that college and graduate work prepared them to use technology, less experienced teachers were generally much more likely than their more experienced colleagues to indicate that this education prepared them to use computers and the Internet.

--Most teachers indicated that professional development activities on a number of topics were available to them, including training on software applications, the use of the Internet, and the use of computers and basic computer training (ranging from 96 percent to 87 percent). Among teachers reporting these activities available, participation was relatively high (ranging from 83 to 75 percent), with more experienced teachers generally more likely to participate than less experienced teachers. Teachers indicated that follow-up and advanced training and use of other advanced telecommunications were available less frequently (67 percent and 54 percent, respectively), and approximately half of the teachers reporting that these two activities were available to them participated in them.

--Over a 3-year time period, most teachers (77 percent) participated in professional development activities in the use of computers or the Internet that lasted the equivalent of 4 days or less (i.e., 32 or fewer hours). Teachers who spent more time in professional development activities were generally more likely than teachers who spent less time in such activities to indicate they felt well prepared or very well prepared to use computers and the Internet for instruction.

### *Barriers to Teachers' Use of Technology*

Certain characteristics of classrooms and schools, such as equipment, time, technical assistance, and leadership, may act as either barriers to or facilitators of technology use. The 1999 FRSS survey indicates that:

--In 1999, the barriers to the use of computers and the Internet for instruction most frequently reported by public school teachers were not enough computers (78 percent), lack of release time for teachers to learn how to use computers or the Internet (82 percent), a lack of time in schedule for students to use computers in class (80 percent). Among the barriers most frequently reported by teachers to be "great" barriers to their use of computers or the Internet for instruction in 1999 were not enough computers (38 percent) and lack of practice time for teachers to learn how to use computers or the Internet (37 percent).

--Teachers' perceptions of barriers to technology use varied by a number of teacher and school characteristics. For example, secondary teachers, teachers in large schools, and teachers in city schools were more likely than elementary teachers, teachers in small schools, and teachers in rural schools, respectively, to report that not enough computers was a great barrier. Additionally, teachers in schools with more than 50 percent minority enrollments were more likely to cite outdated, incompatible, or unreliable computers as a great barrier than teachers in schools with less than 6 percent minority enrollments (32 percent compared with 22 percent).

--Generally, teachers who perceived lacking computers and time for students to use computers as great barriers were less likely than those who did not perceive these conditions as barriers to assign students to use computers or the Internet for some instructional activities. For example, teachers who reported insufficient numbers of computers as a great barrier were less likely than teachers reporting that this was not a barrier to assign students to use computers or the Internet to a 'large extent' for practicing drills (9 percent compared with 19 percent), word processing or creating spreadsheets (14 percent compared with 25 percent), and solving problems and analyzing data (6 percent compared with 13 percent).

### *Summary*

The primary focus of this report is teachers' use of computers or the Internet for instructional purposes. Findings presented in this report indicate that about half of the teachers with computers available in their schools used them for classroom instruction. Moreover, teachers' use of technology was related to their training and preparation and work environments.

As described in detail in the report, teachers were more likely to use these technologies when the technologies were available to them, available in their classrooms as opposed to computer labs, and available in greater numbers. Moreover, teachers who reported feeling better prepared were more likely to use these technologies than their less prepared colleagues. (Teachers who spent more time in professional development reported feeling better prepared than their colleagues.) Finally, teachers who perceived that lacking computers and time for students to use computers, as great barriers were less likely than their colleagues to assign students to use computers or the Internet for some instructional activities.

Source: U.S. Department of Education, Office of Education Research and Improvement, September 2000. National Center for Educational Statistics #2000, 102.